

FIELD OF THE INVENTION

The present device relates to an accessory arch bar which is used to form the dental arch of an orthodontic patient when it is attached outwardly adjacent to the arch wire of a fixed orthodontic appliance.

BACKGROUND OF THE INVENTION

The orthodontic procedures, today, for straightening teeth involve the placement of orthodontic brackets with attached orthodontic arch wires on the external or labial surfaces of the teeth. The labial surfaces of the teeth are the most common locations for fixed orthodontic appliances because of ease of access for the dentist and comfort for the patient. Orthodontic treatment is comprised of a succession of orthodontic arch wires from small diameter round wires, to larger round wires, to larger wires rectangular in cross-section. Orthodontic arch wires have been chosen in size, shape, and composition primarily for individually and mutually aligning the teeth and exert very little formation pressure over the width and shape of the dental arch, especially in the molar areas. Even the larger rectangular cross-section orthodontic arch wires have a small immediate affect upon the width of the dental arch in the molar areas. Larger diameter wires have been used on the internal or lingual surfaces of the teeth. The formation, placement, and adjustment these lingual wires are more difficult than the labial wires because of the lingual location. When adjusted correctly the lingual wires have greater control over the molar width than the labial arch wires, but are in a more difficult area of the mouth to work in.

Early orthodontists realized that the upper and lower dental arches frequently didn't match each other during finishing of an orthodontic treatment and compensated for the weakness of the orthodontic arch wires by forming and coordinating the arch wires into the desired arch form early in treatment. Occlusion of the teeth in a normal, or Class 1, bite helps coordinate the bite; but correction of the bite to a Class 1 bite often does not occur until the end of orthodontic treatment, which does not allow enough time for the occlusion to coordinate the bite. If coordination of the bite has not been accomplished by the end of treatment, the orthodontic arch wires are not strong enough to quickly correct the bite and finish the case. Lingual arch wires can be more effective at this point and can have accessory wires added to them to widen the arch form; however, lingual arch accessory wires do not have precise control over the dental arch form.

SUMMARY OF THE INVENTION

The present invention is directed to a labial accessory arch bar attached to a ~~conventional~~ fixed orthodontic appliance. The arch bar piggybacks the orthodontic arch wire and extends, just as the arch does, on the labial of the teeth, from the molar area on one side of the mouth to molar area on the opposite side of the patient's mouth. The arch wire may be attached to the fixed orthodontic appliance using the same ligature ties used to tie the arch wire to the orthodontic brackets. Elastomeric eyelets are an ideal method of ligation. The arch bar ends may be inserted into a headgear tube on the fixed orthodontic appliance appliance or configured to engage the arch wire. In a preferred embodiment the arch bar is configured straight prior to placement on the fixed orthodontic appliance which quickly widens the molar arch width which is particularly useful in widening of the upper arch width in the correction of a posterior dental cross bite.

In another embodiment of the present invention the accessory arch bar is configured into a planar circle with the ends crossing each other. The arch bar in this circular configuration will narrow the dental arch when placed on the fixed orthodontic appliance. This narrowed form of the arch bar is particularly useful when used with an upper widening arch bar during correction of a posterior cross bite. In an alternative embodiment the arch bar can be used to quickly correct the tilt of an anterior occlusal plane. A tilted occlusal plane exists where the incisal edges of the front teeth appear either lower or higher on one side of the mouth when the teeth are viewed from the front of the patient's mouth. The accessory arch bar is configured in the desired arch form, but in the vertical plane the arch bar is bent upwards or downwards vertically in the direction and areas where the occlusal plane is to be altered.

In another embodiment upper and lower accessory arch bars are shaped into the desired dental arch form and coordinated with each other in order to quickly coordinate the bite during the finishing of an orthodontic treatment. In a further embodiment, the accessory arch bar is configured to open or close an anterior bite. In an anterior open bite, the arch bar is configured towards the occlusal area as it travels from the back of the mouth to the front prior to placement on the orthodontic appliance. In a deep overbite the arch bar is configured where it travels towards the gum line as it travels to the front of the mouth prior to ligating the arch bar to the appliance

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view of the accessory arch bar;

FIG. 2 is an occlusal view of the accessory arch bar placed on a fixed orthodontic appliance;

FIG. 2A is a view of FIG. 2 through the plane of 2A-2A;

FIG. **2B** is a view of FIG. **2** from the plane of **2B-2B**;

FIG. **3** is an occlusal view of the accessory arch bar on a fixed orthodontic appliance;

FIG. **3A** is a view of FIG. **3** from the **3A-3A** plane;

FIG. **3B** is a view of FIG. **3** from the **3B-3B** plane;

FIG. **4A** is a view of the accessory arch bar;

FIG. **4B** is a view of the accessory arch bar;

FIG. **5A** is a view of the accessory arch bar;

FIG. **5B** is a view of the accessory arch bar;

FIG. **5C** is a view of the accessory arch bar;

FIG. **6** is a view of the accessory arch bar on a fixed orthodontic appliance;

FIG. **6A** is a buccal view of FIG. **6** from the **6A-6A** area;

FIG. **6B** is a buccal view of FIG. **6** from the **6B-6B** area;

FIG. **6C** is an occlusal view of an accessory arch bar mounted to a bracket and arch wire;

FIG. **6D** is an occlusal view of an accessory arch bar mounted to a bracket and arch wire;

FIG. **7** is a view of the accessory arch bar configured to correct a tilt of an occlusal plane;

FIG. **8** is a perspective view of FIG. **7** with the accessory arch bar in place;

FIG. **9** is a perspective view of a fixed orthodontic appliance with a configured accessory wire;

FIG. **10** is a perspective view of FIG. **9** with the accessory arch bar in place;

FIG. **11** is a perspective view of a configured accessory arch bar;

FIG. **12** is a perspective view of FIG. **11** with the accessory arch bar in place;

FIG. **13A** is a view of a configured accessory arch wire; and

FIG. **13B** is a view of a configured accessory arch wire.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIGS. **1-13** the accessory arch bar **1** is a wire of sufficient length to be attached, or piggy-backed to an installed orthodontic arch wire **11**. The arch bar diameter can be .020-.60 inch. The cross section of the arch bar is usually circular but can be other shapes, such as square or rectangular. The composition of the arch bar **1** can be stainless steel. In a preferred embodiment the arch bar **1** is .027 inch in diameter and comprised of Ti beta 3 wire. In this embodiment the arch bar **1** is gentle for the patient; but, because of its memory moves the teeth quickly.

As shown in FIG. **2**, a fixed orthodontic appliance is comprised of brackets **10** placed on the outer surface of the patient's teeth **12**. An arch wire **11** is connected to the brackets **10** and held in place with ties **13**, which can be metal wire or elastomeric eyelets. In FIG. **3** the accessory arch bar **1** is shown attached to the orthodontic appliance using the same ties **13** which ligate the arch wire **11** to the

orthodontic brackets **10**. In another embodiment the arch bar **1** can be tied with separate ties to the fixed orthodontic appliance. The single tie **13** method is more efficient.

The end of the accessory arch bar **1** may be straight as in FIG. **1** and inserted into a head gear tube **14** as in FIGS. **3**, **3A**, and **3B**, or configured as in FIGS. **4A** and **4B**. The accessory arch bar **1** end may be bent at a right angle **30** towards the teeth **12** when placed on the fixed orthodontic appliance. This assures the arch bar **1** won't poke the patient and the end of the arch bar **1** won't slip out of the ties **13**. In another configuration of the end **31** of the arch bar **1** the ends are looped towards the teeth **12** to circle the arch wire **11** or looped to engage an elastic hook part of an orthodontic bracket **10**..

The arch bar **1** is configured in a variety of shapes to perform different functions. In one embodiment, FIGS. **1-4**, the arch bar **1** is straight which widens the dental arch in the molar area when placed on the orthodontic appliance as shown in FIG. **3**. This widening is effective in correcting a dental cross bite in the molar area. An example of a posterior cross bite is where an upper molar is towards the center of mouth in relation to the tooth it is occlusion with. In another embodiment in FIGS. **5A**, **5B**, and **5C** the accessory arch bar **1** is configured in a planar arch wherein the arch bar ends cross each other. This embodiment, FIG. **5A**, will narrow the arch form when placed in the mouth. If the ends are looped **31**, as in FIG. **4B**, the placement of the appliance is easier. In many posterior cross bites, the upper arch posterior width is too narrow and the lower molar arch width is too wide. By using the narrowing arch bar **40**, FIG. **5A**, on the lower arch with the widening upper arch bar **11**, FIGS. **1 - 4**, the correction of the posterior cross bite is facilitated and the dental occlusion goes into place more quickly.

In another embodiment in FIG. **7**, the accessory arch bar **1** is first formed in a flat plane and to the desired shape of the dental arch. The arch bar **1** is bent **50** towards the ~~gingival, or gum~~ occlusal area, in order to move the teeth in this area in the direction of the bend **50**. This bend towards the gingival **50** is effective in correcting a cant of the occlusal plane, which exists where the edges of the patient's teeth slant from left to right when the patient's teeth are viewed from a frontal direction. FIG. **8** shows the formed arch bar of FIG. **7** placed on the appliance.

In another embodiment, in FIG. **9**, the accessory arch bar **60** is configured to close an open bite of the front teeth which exists where the patient's upper and lower front teeth do not touch when they are biting together in occlusion. FIG. **9** shows an example of the arch bar **60** bent down, or away from the gums, moving the upper front teeth towards the lower front teeth when the arch bar **60** is engaged, as shown in FIG. **10**. This anterior bend away from the gums **60** may also be done on the lower teeth.

In a further configuration of the accessory arch bar **1**, FIGS. **11** and **12**, the accessory arch bar **1** is bent towards the gums as it travels towards the front of the mouth. When placed in the mouth, FIG. **12**,

the patient's anterior bite is opened in the case of a deep over bite which exists when the upper front teeth bite too deeply over the lower front teeth.

FIGS. **13A** and **13B** show another embodiment of the accessory arch bar **1**, **81** and **82**, wherein the upper and lower arch bars **1** are bent with the same arch form, or coordinated. Because of the strength of the arch bars **1** the upper and lower dental arches are quickly coordinated which facilitates the rapid finishing of active orthodontic treatment.

The composition of the accessory arch bar **1** is the same as orthodontic arch wires **11** which are primarily stainless steel, but include titanium wires. In a preferred embodiment the accessory arch bar **11** is .027 in. with a composition of .02% C, 10.12 % Mo, .05 % Fe, .01% N, .165 % O, .01 % H₂, 5.48 % Zr, 4.78 % Sn, and balance Ti. This is known as Ti beta 3 and produces a super elastic accessory arch bar **1** which is gentle to the patient and because of superior memory produces rapid movement of the teeth.

The foregoing description of the present invention has been presented for the purpose of the illustration and description. Furthermore, the description is not intended to limit the invention to the use as described herein. Consequently, variations and modifications commensurate with the above teachings by someone skilled in the art at the time of the invention are within the scope of the present invention.

The embodiments described are intended to explain best modes known of practicing the invention at the time of the invention and are intended to include future uses of the invention such as a pending invention by the inventor wherein the accessory arch bar has an open coil spring assembly attached to it which transmits force via pulleys and cables to the opposing dental arch in bite correction.